800V 4A N-Channel Enhancement Mode Power MOSFET

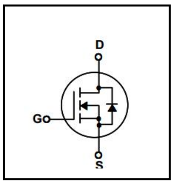
General Description

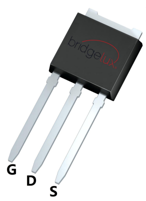
BXP4N80 is Bridgelux high voltage MOSFET family based on advanced planar stripe DMOS technology. This advanced MOSFET family has optimized on-state resistance, and also provides superior switching performance and higher avalanche energy strength. This device family is suitable for high efficiency switch mode power supplies.

FEATURES

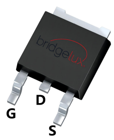
- RDSON⩽4Ω @Vgs=10V, Id=2A
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Fast switching capability
- Lead free product is acquired

SYMBOL





TO-251L



TO-252

ASSEMBLY MESSAGE

Product Name	Marking	Package	Packaging
BXP4N80U	BXP4N80U	TO-251L	Tube
BXP4N80D	BXP4N80D	TO-252	Tube/Reel

ABSOLUTE MAXIMUM RATINGS (T_C=25°C unless otherwise noted)

Parameter		Symbol	Rating	Unit
			BXP4N80U/BXP4N80D	
Drain-Source Voltage		V_{DSS}	800	V
Drain Current	Continuous (T_C = 25°C)	I_D	4	A
	Continuous (T_C = 100°C)		2.2	A
Drain Current	Pulsed (Note1)	I_{DM}	16	A
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Energy	Single Pulse (Note2)	E_{AS}	460	mJ
	Repetitive (Note1)	E_{AR}	13	mJ
Avalanche Current (Note1)		I_{AR}	4	A
Peak Diode Recovery dv/dt (Note3)		dv/dt	4.0	V/ns
Power Dissipation (Note 2)	T_C =25°C	P_D	130	W
	Derate above 25°C		1.04	W/°C
Maximum Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{STG}	-55 to 150	°C

Note： 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. I_{AS}=4.0A, V_{DD}=50V, RG=25 Ω, Starting TJ = 25°C

3. I_{SD} ≤ 4.0A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting TJ = 25°C

THERMAL CHARACTERISTICS

Parameter	Symbol	Max. BXP4N80U/BXP4N80D	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.96	°C / W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°C / W

ELECTRICAL CHARACTERISTICS （T_J=25℃,unless otherwise Noted）

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS=0V, ID=250μA	800			V
Zero Gate Voltage Drain Current	I_{DSS}	VDS=800V, VGS=0V			1	uA
		VDS=640V, TC = 125°C			100	uA
Gate-Body Leakage Current, Forward	I_{GSS}	VGS=30V			100	nA
Gate-Body Leakage Current, Reverse		VGS=-30V			-100	nA
Breakdown Voltage Temperature Coefficient	△BVDSS/△TJ	ID = 250 μA		0.95		V/℃
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	VDS=VGS, ID=250μA	3	3.5	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	VGS=10V, ID=2A		3.5	4	Ω
Forward Transconductance (Note4)	g_{FS}	VDS = 50V, ID = 2A		5.3		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	VDS=25V, VGS=0V, f=1.0MHz		685		pF
Output Capacitance	C_{OSS}			76		pF
Reverse Transfer Capacitance	C_{RSS}			8.8		pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	VDD=400V, ID=4 A, VGS = 10V ,RG=10Ω (Note4,5)		17		ns
Turn-ON Rise Time	t_R			46		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			36		ns
Turn-OFF Fall-Time	t_F			36		ns
Total Gate Charge(Note5)	Q_G	VDS =640V, VGS =10V, ID =4A (Note4,5)		20		nC
Gate Source Charge	Q_{GS}			4.5		nC
Gate Drain Charge	Q_{GD}			9.2		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V_{SD}	IS=4A, VGS=0V			1.4	V
Diode Continuous Forward Current	I_S				4	A
Pulsed Drain-Source Current	I_{SM}				16	A
Reverse Recovery Time	t_{RR}	VGS = 0 V, ISD = 4A di/dt=100 A/μs (Note4,5)		580		ns
Reverse Recovery Charge	Q_{RR}			3.68		uC

Note： 4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

5. Essentially independent of operating temperature

TYPICAL CHARACTERISTICS

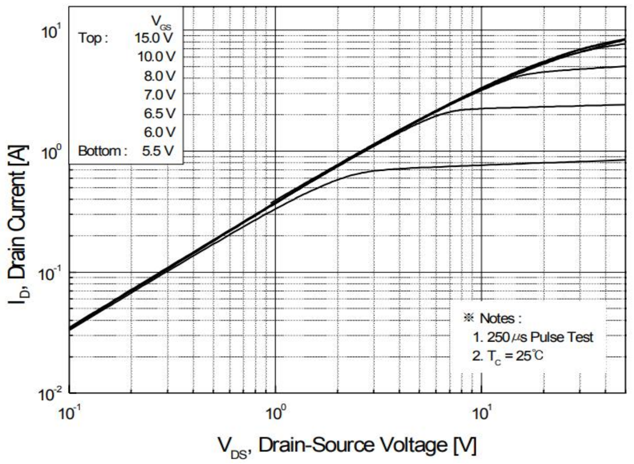


Figure 1.Typical Output Characteristics

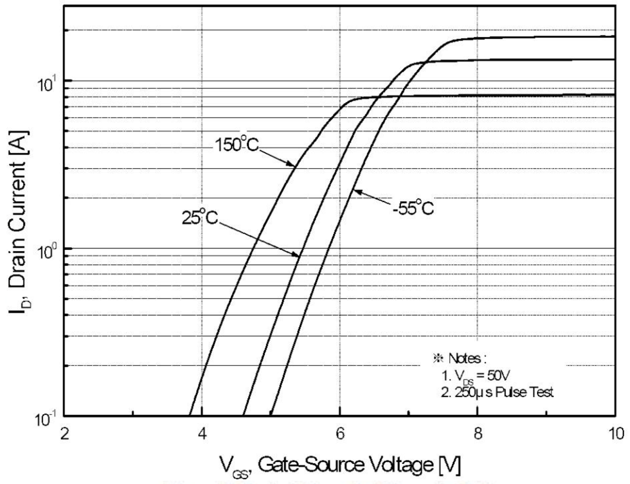


Figure2.Typical Transfer Characteristics

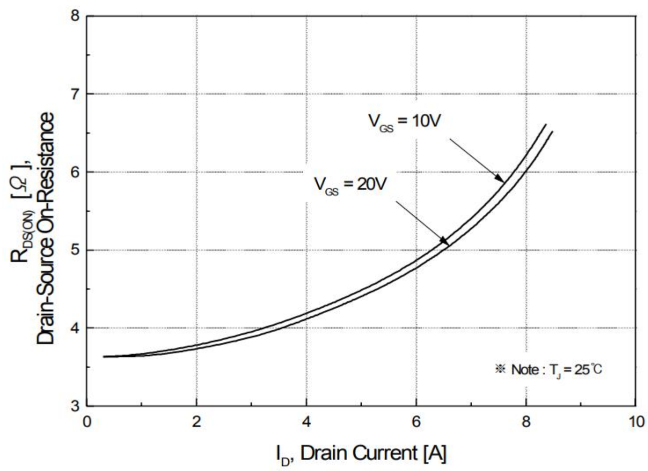


Figure 3.On-Resistance versus Drain Current

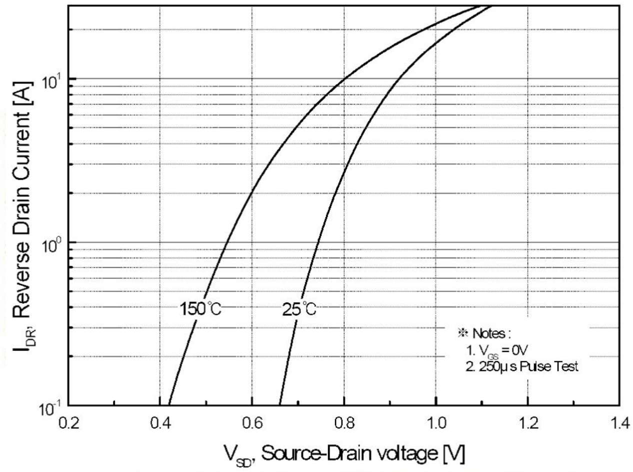


Figure 4.Diode Forward Voltage versus Current

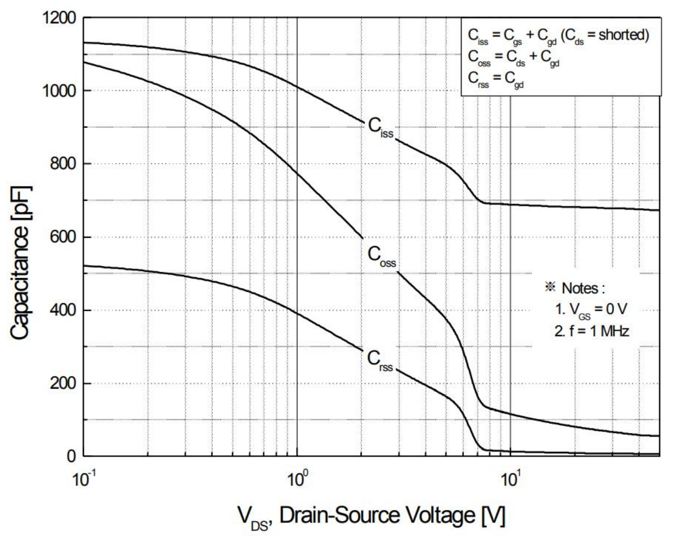


Figure 5.Typical Capacitance vs.Drian-to-Source Voltage

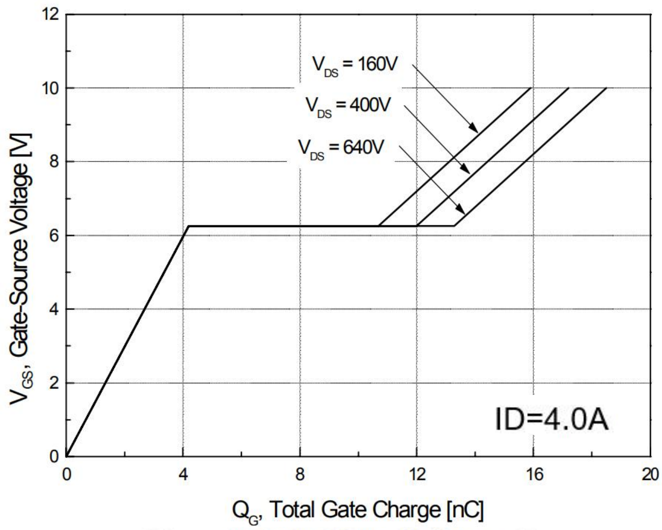


Figure 6.Typical Gate Charge vs.Vgs

TYPICAL CHARACTERISTICS(Cont.)

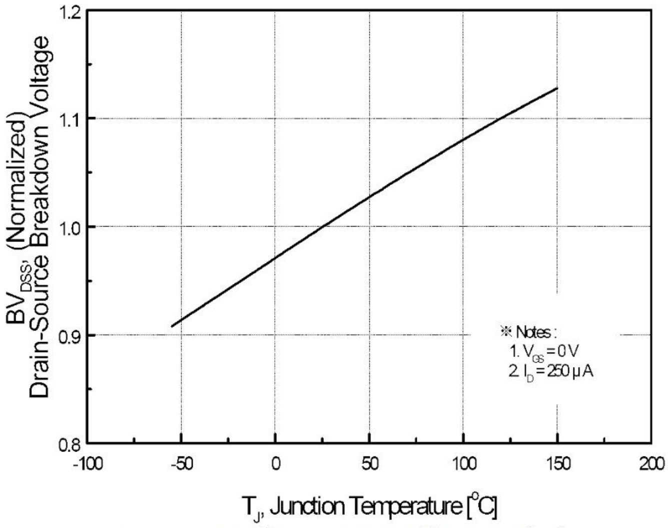


Figure 7.Bvdss Variation with Temperature

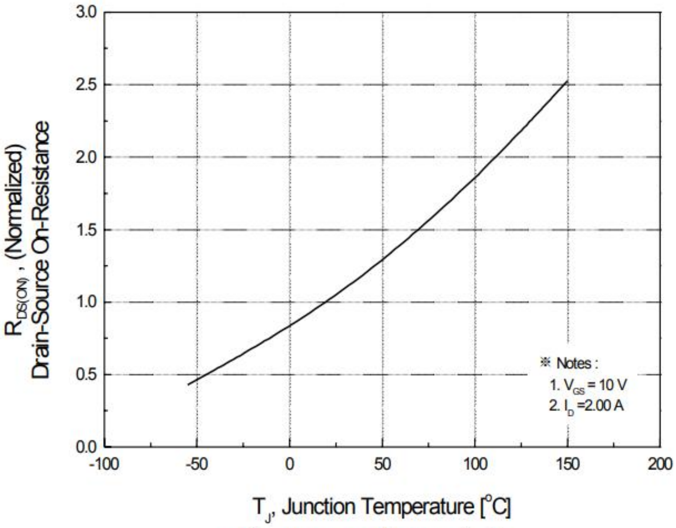


Figure 8.On-Resistance Variation with Temperature

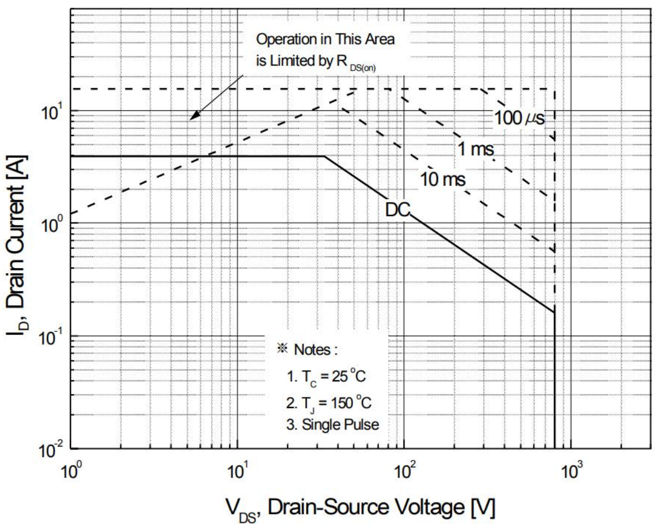


Figure 9. Maximum Safe Operating Area

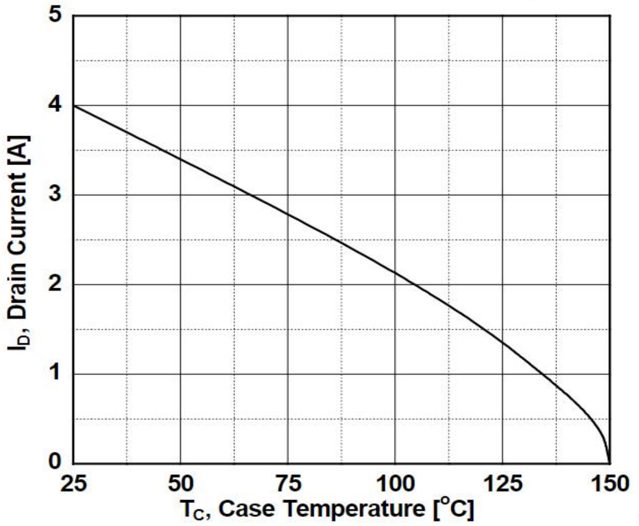
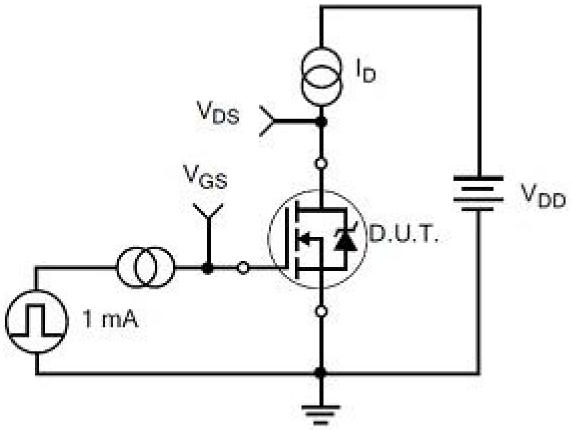
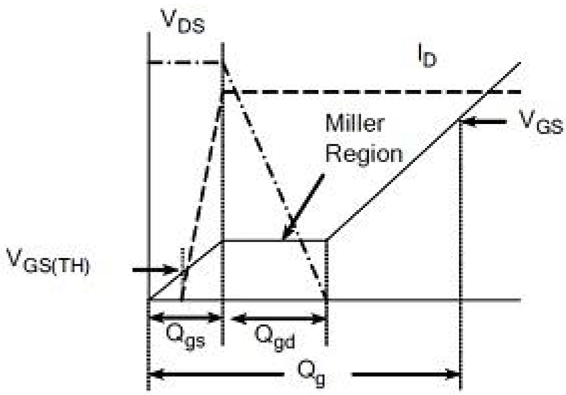


Figure 10. Maximum Continuous Drain Current vs Case Temperature

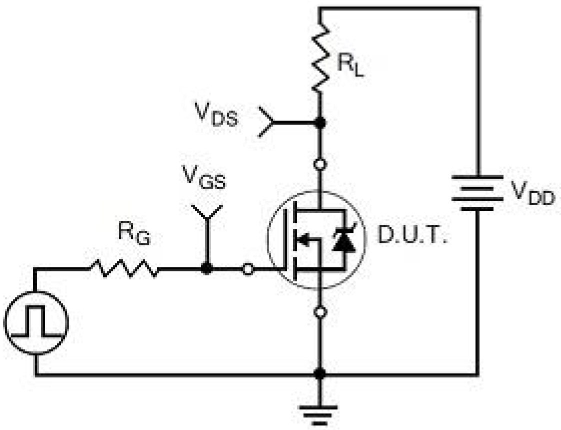
TEST CIRCUITS AND WAVEFORMS



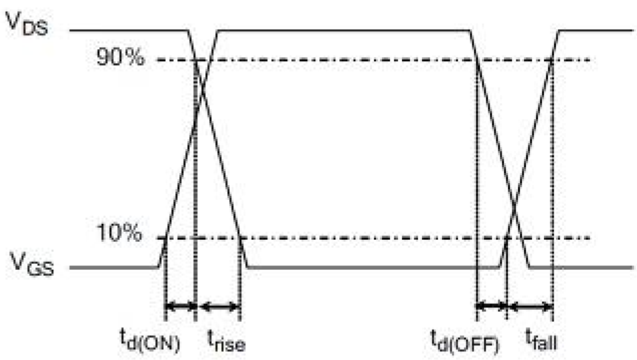
Gate Charge Test Circuit



Gate Charge Waveform

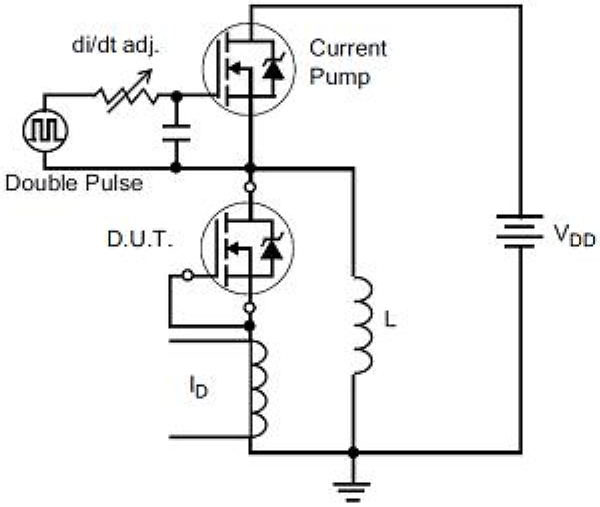


Resistive Switching Test Circuit

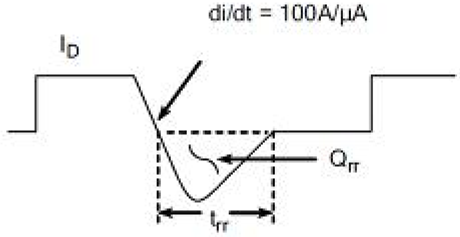


Resistive Switching Waveforms

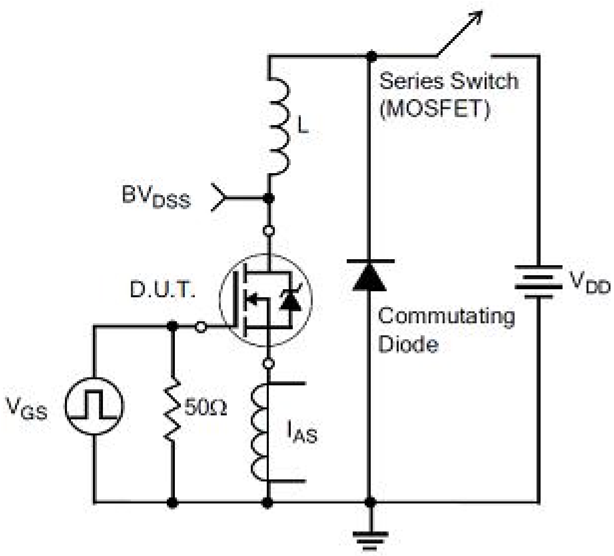
TEST CIRCUITS AND WAVEFORMS(Cont.)



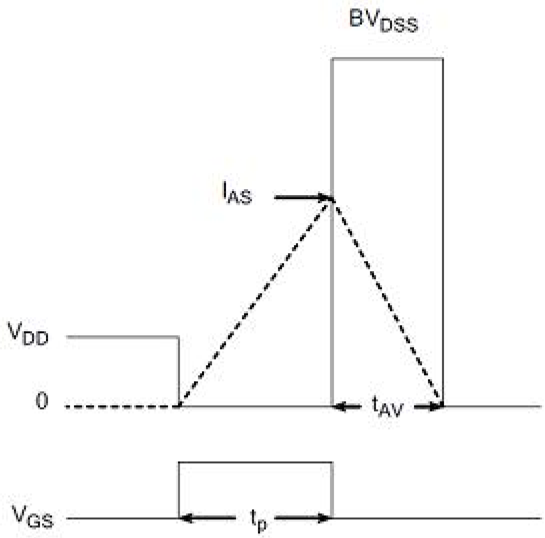
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Unclamped Inductive Switching Waveforms

Revision history

Document revision history

Date	Revision	Changes
25-Apr-2021	1.0	First release
5-Jan-2022	1.1	Update parameter

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